

perature falls below 40° , and is, therefore, likely to cause a frost injurious to vegetation, but all falls of 20° are indicated on the Daily Weather Map by inclosing the areas within which they occur by heavy dotted lines, and the following list enumerates these regions for the month of July (the dimensions of the principal axes of the areas are stated in miles):

(A) 20th, a. m., 200 by 300 over Lake Superior. This fall represented the front of a mass of cool air flowing southward in connection with high area No. IV. 20th, p. m., 100 by 200, southeastern Michigan. This fall was due largely to the change from bright sunshine on the 19th to rain on the 20th, accompanied by the cold, northerly winds of high No. IV. This cold area does not appear on the map of the 21st, a. m., although falls of 18° occurred at Montreal and Buffalo, but it reappeared on the map of the 21st, p. m., when falls of 20° occurred at Boston and Albany and 18° at Portland, Me., representing an area of about 150 by 250. The relations of the so-called local storms to the general movements of the atmosphere were elucidated by Marie-Davy in 1864 and E. Fron in 1867; in 1871 the present editor showed that a very important class of our local rains and thunderstorms occurs at the front of advancing waves of cool, dry air, and may, therefore, be described as located on the south and east sides of areas of high pressure. When the winds develop into a cyclonic system the local storms are carried around to the

south and east sides of the cyclonic center and are most frequent in the area of southerly surface winds.

(B) The map of the 25th, 8 p. m., shows a fall of 20° at Chicago, 26° at Duluth, and 18° at Port Arthur, but these three falls are apparently local matters due to the change from hot land breezes to cold lake breezes. On the other hand the stations in Montana, Assiniboina, and Alberta also show falls of 20° or more, evidently due to the inflow of cool air in the rear of low No. XII and in advance of high No. V; an area of 300 by 400 is covered by this fall. 26th, p. m., 200 by 150 in the western part of North Dakota. 27th, p. m., 100 by 100, South Dakota and Nebraska. 28th, p. m., 100 by 100, Upper Michigan. These successive areas of 20° fall are apparently all due to the change of wind and temperature immediately following in the rear of low No. XII.

(C) 30th, 8 p. m., 300 by 200, Wisconsin and Minnesota. This represents the front of an area of high pressure descending southward in connection with low No. XIII, but the heaviest fall, 26° , at Duluth, was largely due to the change from land breeze to lake breeze.

FROSTS.

Notwithstanding the high temperature of July a few reports of frosts have been received, viz, 9th, light at Garrettsville and Lordstown, Ohio; Cassandra, Lock Haven, Saegertown, Kane, and Somerset, Pa.

PRECIPITATION.

[In inches and hundredths.]

The distribution of precipitation for the month of July, 1894, as determined by reports from about 2,000 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III; the first of these also gives the average departures from the normal for each district, whereas the average departure for each State is given in the chapter on State Weather Services.

NORMAL PRECIPITATION FOR JULY.

The normal precipitation for the month of July is usually greatest on the east Gulf and west Florida coasts. From 4 to 6 inches usually falls in the Mississippi Valley and westward to the Rocky Mountain slope. Less than 1 inch is to be expected in Oregon and the plateau region, and little or none in California.

PRECIPITATION FOR CURRENT MONTH.

The total precipitation for the current July was heaviest in southeastern Georgia and South Carolina, where it ranged between 10 and 15 inches. From this region outward it diminished to about 2 inches at Key West, 6 inches at Galveston and Norfolk, and in northern Georgia, northern Mississippi, and western North Carolina; 1 inch or more fell in the region southeast of central Michigan, central Illinois, northern Missouri, eastern Oklahoma, and central Texas. The average rainfall for Iowa, Wisconsin, Minnesota, and the eastern portion of Kansas, Nebraska, North and South Dakota was about one-half inch, constituting the beginning of a severe drought and stimulating useless efforts at rain-making in various parts of these States. The operations on the 14th, 15th, 16th, and 26th to 31st, by several persons in different places, do not seem to have given those localities any more rain than happened in their neighborhood.

CURRENT DEPARTURES FROM NORMAL PRECIPITATION.

The precipitation for July was in excess over the greater part of the Gulf and south Atlantic States, but decidedly deficient in the Middle and Eastern States, Ohio Valley, the Lake region, and Missouri and upper Mississippi valleys.

The principal departures from the normal were:

Excesses: New Orleans, 5.1; Augusta, 5.8; Savannah, 8.1. Deficits: Dubuque, 4.9; Omaha, 4.7; Lexington, 4.3; Keokuk, 3.9; Philadelphia, 3.8; Pittsburg and Huron, 3.7; Indianapolis, 3.5; Davenport, 3.4; Halifax, Chicago, and St. Paul, 3.2.

The following table shows for certain stations, as reported by voluntary observers, the normals and extremes of total precipitation for this month and the current departures:

State and station.	(1) Average for the month of July.	(2) Length of record.	(3) Total for July, 1894.	(4) Departure from average.	(5) Extremes for July.			
					Greatest.		Least.	
					Amt.	Year.	Amt.	Year.
Arizona.	Inches.	Years.	Inches.	Inches.	Inches.		Inches.	
Fort Apache	3.75	18	1.27	- 2.48	8.76	1878	0.14	1884
Whipple Barracks	2.89	23	1.13	- 1.76	5.92	1875	0.55	1877
Arkansas.								
Keesee Ferry.....	4.74	12	10.52	+ 5.78	11.60	1883	1.15	1888
California.								
Riverside.....	T.	13	0.00	- T.	0.02	1888	0.00	*
Colorado.								
Las Animas.....	1.67	11	0.10	- 1.57	4.66	1886	0.10	1894
Florida.								
Merritts Island.....	5.88	16	3.87	- 2.01	11.72	1884	0.86	1883
Georgia.								
Forsyth.....	4.77	20	5.91	+ 1.14	12.70	1887	0.32	1878
Idaho.								
Boise Barracks	0.17	20	0.00	- 0.17	0.60	1884	0.00	†
Fort Sherman.....	0.51	10	T.	- 0.51	1.67	1884	0.00	1882, 1883
Indiana.								
Lafayette.....	3.53	12	1.55	- 1.98	5.81	1884	0.88	1887
Iowa.								
Cresco	4.24	21	0.09	- 4.15	12.70	1883	0.09	1894
Kansas.								
Independence	4.15	22	2.36	- 1.79	11.56	1875	0.77	1888
Louisiana.								
Sainte.....	4.17	10	0.33	- 3.84	7.20	1885	0.30	1890
Maine.								
Grand Coteau.....	5.76	10	6.54	+ 0.78	12.36	1889	1.89	1888
Maryland.								
Orono	3.40	23	2.41	- 0.99	7.11	1887	1.05	1886
Pennsylvania.								
Cumberland.....	3.41	22	3.23	- 0.18	5.59	1887	1.01	1885
Michigan.								
Kalamazoo	3.38	18	1.34	- 2.04	6.50	1877	0.79	1887
Missouri.								
Sedalia	4.35	16	2.81	- 1.54	10.21	1893	0.62	1886
Montana.								
Fort Custer.....	1.03	13	1.75	+ 0.72	2.51	1880	0.06	1890

Departures from average precipitation—Continued.

State and station.	(1) Average for the month of July.	(2) Length of record.	(3) Total for July, 1894.	(4) Departure from average.	(5) Extremes for July.			
					Greatest.		Least.	
					Amt.	Year.	Amt.	Year.
Nebraska.	Inches.	Years	Inches.	Inches.	1891	1886	1877	
Fort Robinson.	2.15	10	2.96	+ 0.81	3.24	0.74		
Genoa (near).	4.23	18	1.00	- 3.23	7.45	0.90		
Nevada.								
Brown.								
Carson City.	0.18	16	0.23	+ 0.05	1.25	1886	0.00	†
New Hampshire.								
Hanover.	3.40	21	2.26	- 1.14	8.48	1877	1.66	1884
New Mexico.								
Fort Wingate.	2.18	23	1.91	- 0.27	4.64	1883	0.26	1873
New York.								
Cooperstown.	3.45	23	3.41	- 0.04	7.80	1892	1.52	1888
Plattsburgh Barracks.	3.65	23	2.52	- 1.13	9.18	1874	1.12	1888
North Carolina.								
Lenoir.	4.70	21	4.97	+ 0.27	9.10	1886	1.70	1884
Oklahoma.								
Fort Reno.	2.85	11	1.31	- 1.54	6.97	1891	0.82	1886
Fort Sill.	2.54	23	1.91	- 0.63	8.21	1875	0.19	1871
Fort Supply.	3.75	15	2.63	- 1.12	9.34	1881	0.98	1886
Oregon.								
Bandon.	0.61	15	0.05	- 0.56	1.90	1878	0.00	1885
Pennsylvania.								
Dyberry.	4.68	23	1.26	- 3.42	9.28	1887	1.26	1894
Grampian.	4.97	23	4.06	- 0.91	7.33	1889	2.41	1892
Wellsboro.	5.72	15	3.88	- 1.84	12.30	1880	2.15	1892
South Carolina.								
Statesburg.	4.67	13	8.72	+ 4.05	8.72	1894	1.70	1884
South Dakota.								
Fort Sully.	2.92	23	0.90	- 2.02	7.45	1878	0.25	1890
Texas.								
Austin.	1.80	21	T.	- 1.80	5.16	1874	0.00	1871, 1884
Silver Falls.	1.82	7	0.27	- 1.55	3.06	1886	0.27	1894
Utah.								
Terrace.	0.15	20	T.	- 0.15	0.75	1874	0.00	†
Vermont.								
Strafford.	4.32	21	1.22	- 3.10	6.77	1873	0.91	1892
Virginia.								
Dale Enterprise.	4.37	14	2.24	- 2.13	7.05	1887	1.13	1883
Washington.								
Fort Townsend.	0.80	19	0.20	- 0.60	4.41	1888	0.01	1889
West Virginia.								
Parkeburg.	4.98	9	10.33	1888	2.17	1885	
Wisconsin.								
Madison.	4.18	23	1.75	- 2.43	9.47	1881	0.79	1886
Wyoming.								
Fort Washakie.	0.71	9	0.38	- 0.33	1.26	1886	0.07	1893

*Generally.

† Frequently.

Considered by districts, the precipitation for July, 1894, when compared with the normal for the month, furnishes the departures given in Table I, as expressed in inches. By dividing those departures by the normal precipitation for June we obtain the following corresponding percentages (precipitation is in excess when the percentage of the normal exceeds 100):

Below the normal: New England, 36; middle Atlantic States, 71; Key West, Ohio Valley, and Tennessee, 52; lower Lake region, 61; upper Lake region, 35; North Dakota, or the extreme northwest, 16; upper Mississippi Valley, 20; Missouri Valley, .46; northern slope, 72; middle slope, 73; southern slope (Abilene), 50; southern plateau, 68; northern plateau, 29; north Pacific, 56.

Normal: Southern Pacific, 100; middle Pacific, 100.

Above the normal: South Atlantic, 133; east Gulf States, 128; west Gulf States, 135; middle plateau, 267.

YEARS OF GREATEST PRECIPITATION FOR JULY.

The precipitation for the current month was the greatest on record for the month of July at the regular Weather Bureau stations shown in the following table:

Station.	Current precipitation.		Previous maximum.	
	Amount.	Departure.	Amount.	Year.
Savannah, Ga.	13.18	+	8.1	1874
Corpus Christi, Tex.	4.87	+	2.8	1888

YEARS OF LEAST PRECIPITATION FOR JULY.

The precipitation for the current month was the least on

record for the month of July at the regular Weather Bureau stations shown in the following table:

Station.	Current precipitation.		Previous minimum.	
	Amount.	Departure.	Amount.	Year.
Eastport, Me.	1.21	—3.1	1.21	1892
Nantucket, Mass.	0.29	—2.7	0.91	1893
Block Island, R. I.	0.22	—3.0	0.86	1893
New London, Conn.	0.44	—3.9	1.35	1893
Woods Hole, Mass.	0.68	—2.7	1.56	1873
Philadelphia, Pa.	0.75	—3.8	0.92	1876
Atlantic City, N. J.	0.15	—3.3	0.92	1876
Harrisburg, Pa.	1.89	—2.4	1.92	1893
Pittsburg, Pa.	1.16	—3.7	1.99	1882
Parkersburg, W. Va.	1.18	—3.2	2.22	1893
Knoxville, Tenn.	2.24	—2.1	2.30	1872
Lexington, Ky.	0.87	—4.5	3.11	1893
Cincinnati, Ohio.	0.13	—3.0	1.31	1887
Toledo, Ohio.	0.42	—2.8	0.59	1896
Port Huron, Mich.	0.65	—1.9	0.69	1892
Alpena, Mich.	0.91	—2.3	1.48	1882
Grand Haven, Mich.	0.57	—2.4	0.90	*
Fort Smith, Ark.	1.59	—2.2	1.77	1882
Keokuk, Iowa.	0.37	—3.9	0.65	1896
Dubuque, Iowa.	0.02	—4.9	1.21	1890
La Crosse, Wis.	0.35	—4.2	1.46	1890
St. Paul, Minn.	0.13	—3.2	0.52	1877
Valentine, Nebr.	0.97	—2.1	1.19	1893
Huron, S. Dak.	0.23	—3.7	1.01	1891
Moorhead, Minn.	1.03	—3.3	1.95	1892
Bismarck, N. Dak.	0.30	—2.1	1.14	1890
Williston, N. Dak.	0.02	—2.0	0.56	1886
Miles City, Mont.	0.27	—1.1	0.39	1881
Helena, Mont.	0.32	—0.6	0.32	1883

ACCUMULATED PRECIPITATION.

The total accumulated monthly departures from normal precipitation from the beginning of the year to the end of the current month are given in the second column of the following table; the third column gives the ratio of this current accumulated precipitation to its normal value:

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
New England.	-8.10	70	North Dakota (Ex. N. W.)	+0.30	102
Middle Atlantic.	-4.88	82	Middle slope.	1.40	111
South Atlantic.	-5.10	84	Middle plateau.	0.70	109
Key West.	-5.88	68	Northern plateau.	2.80	123
East Gulf.	-3.30	91	North Pacific.	-10.50	132
West Gulf.	-2.00	90			
Ohio Valley and Tennessee.	-6.00	80			
Lower Lake.	-2.10	90			
Upper Lake.	0.00	100			
Upper Mississippi.	-7.60	66			
Missouri Valley.	-5.14	75			
Northern slope (Abilene).	-0.30	97			
Southern slope (Abilene).	-1.20	93			
Middle Pacific.	-1.70	72			
South Pacific.	-2.10	89			
	-4.60	48			

DIURNAL VARIATION.

Table IVb gives the total precipitation for each hour of seventy-fifth meridian time, as deduced from self-registering gauges kept at about 48 regular stations of the Weather Bureau. The stations in the southern portion of the United States owed their rainfall during this month to local land and sea breezes and other forms of local vertical circulation chiefly due to local insolation; the hot sun and moist air not only facilitate thermal convection currents from the surface of the ground upward sufficiently high to form clouds, but the action of the sun also on the tops of the clouds further stimulates this convection, and tends to give the maximum rainfall during the hours of sunshine and especially between the hours of 11 a. m. and 4 p. m. Stations in the northern portions of the United States have a drier atmosphere and slightly feebler insolation; the local thermal convection currents more frequently fail to rise high enough to form clouds, and the rain in this region is more frequently due to the nearly horizontal inflow of colder air from long distances, which, by uplifting the surface layer, produces rain most eas-

ily when the dynamic cooling is supplemented by the nocturnal radiation. Therefore, these regions are more likely to have their maximum rainfall during the nighttime and especially between 8 p. m. and 4 a. m.

EXCESSIVE PRECIPITATION.

The following tables for July, 1894, show, by States, the number of stations reporting total precipitation to equal or exceed 10.00 inches during this month, 2.50 in 24 hours, and 1.00 in 1 hour:

Monthly precipitation to equal or exceed 10.00.

State.	Number of stations.	State.	Number of stations.
Georgia.....	16	North Carolina.....	4
South Carolina.....	11	Alabama.....	1
Florida.....	10	Arkansas.....	1
Louisiana.....	4		

Daily precipitation to equal or exceed 2.50 in 24 hours.

State.	Number of stations.	Dates.	State.	Number of stations.	Dates.
Georgia.....	19	2-3, 9, 9-10, 10, 13-14, 15, 15-16, 17-18, 18, 20, 23-24, 24, 26-27, 29, 29-30, 30-31.	Alabama.....	6	16, 20, 21.
Florida.....	4	1, 27, 30-31.	Florida.....	4	1, 17, 18, 19,
Ohio.....	4	20, 20-21.	Ohio.....	4	21, 22-23, 23-24,
Virginia.....	4	6, 21, 21-22, 22, 23-24.	Tennessee.....	2	4-5, 22.
South Carolina....	12	3-4, 9-10, 10, 16-17, 17, 17-18, 18, 19, 21, 22-23, 23-24, 24, 25.	Colorado.....	3	3-3-4, 31.
Arkansas.....	11	4-5, 8, 8-9, 9, 19.	New York.....	3	6, 18, 20.
Missouri.....	10	4, 28-29, 31.	Maryland.....	2	6, 21.
North Carolina....	9	1-2, 2, 17, 21, 22, 22-23, 23, 31.	Michigan.....	2	1, 20.
Mississippi.....	8	6, 9, 16, 17, 20-21, 25-26, 27.	Tennessee.....	2	4-5, 22.
Texas.....	8	6-7, 7, 15-16, 17-18, 19-20, 30.	Illinois.....	1	31.
Louisiana.....	7	4, 6, 8, 14-18, 22, 30.	Indiana.....	1	1.
			Iowa.....	1	31.
			Massachusetts.....	1	24.
			New Jersey.....	1	6.
			Pennsylvania.....	1	6.
			West Virginia.....	1	22-23.

Hourly precipitation to equal or exceed 1.00.

Georgia.....	17	5, 6, 10, 15, 16, 18, 19, 23, 26, 29, 30.	Massachusetts	4	2, 17, 21.
Louisiana.....	10	3, 4, 13, 14, 15, 16, 17, 20, 22, 26.	Michigan.....	4	20.
South Carolina ...	10	3, 5, 9, 16, 17, 19, 23, 25, 30.	Kansas.....	3	7, 19, 29.
North Carolina ...	9	1, 17, 19, 21, 22, 23, 26, 30, 31.	New York.....	3	6, 18, 27.
Florida.....	7	1, 4, 9, 11, 12, 14, 17, 21, 31.	Ohio.....	3	20.
Mississippi.....	7	1-2, 6, 8, 16, 17, 20, 21, 31.	Arkansas.....	2	5, 19.
Alabama.....	6	9, 15, 16, 18, 22.	Indiana.....	2	19, 20.
Missouri.....	6	1, 4, 19, 20, 31.	Maryland.....	2	21, 27.
New Jersey.....	5	6, 31.	Nebraska.....	2	8.
Pennsylvania.....	5	2, 20, 21, 24.	Colorado.....	1	4.
Tennessee.....	5	17, 19, 20, 26, 30, 31.	Indian Territory.....	1	16.
Virginia.....	5	1, 6, 17, 21, 22, 25.	Iowa.....	1	19.
Illinois.....	4	20, 26, 31.	Kentucky.....	1	19.

Excessive precipitation, by stations, for July, 1894.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall 1 inch, or more, in one hour.	
		Amt.	Day.	Amt.	Time.
<i>Alabama.</i>					
Citronelle.....		Inches.	Inches.	Inches.	h. m.
Highland Home.....				1.97	0 30
Madison Station.....		2.63	21		22
Maple Grove.....		2.65	6		
Mobile.....				1.12	1 00
Montgomery.....				1.08	1 00
Rock Mills.....		13.57	4.58	16	9
Scottsboro.....		10.41		4.58	2 40
Do.....				1.25	1 00
Uniontown.....				6.00	15
Do.....				6.00	4 30
Fort Grant.....		3.87	20		16
Bee Branch.....				1.70	1 25
Camden b.....				2.00	2 00
				1.63	1 30
					19
<i>Arizona.</i>					
Fort Grant.....					
<i>Arkansas.</i>					
Bee Branch.....					
Camden b.....					

Excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.	
		Amt.	Day.	Amt.	Time.
<i>Arkansas—Continued.</i>					
Fulton.....		Inches.	Inches.	Inches.	h. m.
Helena a.....				3.82	9
Helena b.....				3.41	8-9
Keesees Ferry.....				2.87	9
Do.....				5.22	4-5
Kirby.....				3.93	19
Little Rock.....				2.92	8-9
Lonoke.....				3.00	8
Newport a.....				3.90	4-5
Newport b.....				4.40	4-5
Newport c.....				4.55	4-5
Pocahontas.....				3.33	4-5
<i>Colorado.</i>					
Cheyenne Wells.....				3.00	31
River Bend.....				4.00	3-4
Twin Lakes.....				3.70	3
<i>Florida.</i>					
Archer.....		Inches.	Inches.	Inches.	h. m.
Avon Park.....		12.21			
Brooksville.....		10.08			
Eustis.....		11.68		2.85	1 200
Gainesville.....				3.32	30-31
Grasniers.....		10.70			
Jacksonville.....		11.55		2.78	1 278
Kissimmee.....		11.46			
Moseley Hall.....		15.29			
Orange Park.....				1.31	0 45
Pensacola.....		10.45		2.71	27
St. Francis Barracks.....		12.60			
Tallahassee.....		11.56			
Tampa.....				1.58	0 30
Turpentine springs.....		10.00		1.06	1 00
<i>Georgia.</i>					
Alapaha.....				1.72	1 30
Americus.....				2.65	23-24
Atlanta.....				2.64	29-30
Augusta.....				1.14	0 52
Do.....				1.20	0 35
Brag.....		10.40			
Canak.....				2.96	30-31
Clayton.....				1.95	1 30
Columbus.....				1.69	1 00
Do.....				1.62	1 30
Cordelia.....		10.54		2.59	29
Covington.....				10.54	26-27
Dublin a.....		10.13		4.07	9-10
Dublin b.....		10.75		4.37	9-10
Eastman.....				2.83	2-3
Fleming.....		11.96		1.00	0 30
Griffin.....				1.05	0 30
Hawkinsville.....		12.23		5.10	26-27
Do.....		14.84		3.65	9
Hephzibah.....		12.10		3.02	15
Do.....				2.75	9-10
Leverett.....				3.00	24
Louisville.....		10.08		2.80	30
Marshallville.....		11.96		2.63	10
Millen.....		12.92		3.82	9-10
Point Peter.....				3.20	18
Quitman.....		12.69		3.05	20
Savannah.....		13.18		4.21	9-10
Do.....				2.55	17-18
Thomasville.....		12.43			
Way Cross.....		10.84		3.36	13-14
Waynesboro.....		15.86		5.43	9-10
West Point.....				1.19	0 53
<i>Illinois.</i>					
East Peoria.....				1.54	0 25
Mattoon.....				2.19	1 30
Mount Pulaski.....				2.90	2 15
Springfield.....				1.18	1 00
<i>Indiana.</i>					
Butlerville.....				1.34	0 40
Crawfordsville.....				1.37	1 08
Madison.....				1.95	0 50
<i>Indian Territory.</i>					
Healdton.....				1.25	0 15
Centerville.....				1.25	1 19
Corning.....				2.50	31
<i>Kansas.</i>					
Coldwater.....					2.25
Garfield.....					1.33
Johnson.....					1.22
<i>Kentucky.</i>					
Louisville.....				1.00	1 00
<i>Louisiana.</i>					
Bastrop.....				2.50	6
Baton Rouge.....				2.80	18
Cameron.....					1.31
Clinton.....					0 30
Emilie.....					1.25
Farmerville.....				3.35	8
Franklin.....				4.00	30
Hammond.....				10.46	2.92
Lafayette.....					1.45
Lake Charles.....					1.50
New Orleans.....				11.51	0 52
Do.....				1.37	1 00

Excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.		Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.	
	Amt.	Day.	Amt.	Time.	Amt.	Day.
Louisiana—Continued.						
Opelousas	Inches.	Inches.	Inches.	h. m.		
Do.			1.06	1 00	4	
Plaquemine	10.17	3.05	1.46	1 00	17	
Port Eads		22				
Rayne			1.82	1 45	3	
Shreveport			1.06	1 00	16	
Sugar Ex. Station	12.71		1.68	1 10	3	
Do.	3.02	4	3.02	1 10	4	
Maryland.						
Easton		3.04	21	3.04 2 00	21	
Mardela Springs		4.47	6			
Sunnyside			1.00	1 00	27	
Massachusetts.						
Boston (V.O.)			1.12	1 00	21	
Fall River			1.05	1 00	2	
Mount Nonotuck			1.04	1 00	17	
Newburyport		2.74	24			
Worcester a.			1.39	1 20	17	
Michigan.						
Detroit			1.01	1 00	20	
Fitchburg		3.10	20	3.10 2 00		
Hanover			1.00	1 00	20	
Rawsonville			1.10	1 00	20	
Vandalia		2.52	1			
Minnesota.						
Morris	Mississippi.		1.00	1 00	30	
Bay St. Louis		2.80	25-26			
Do.		4.40	27			
Briers		3.60	17	3.60 1 30	17	
Brookhaven		2.56	20-21			
Columbus			1.15	0 45	21	
Crystal Springs		2.90	16	2.90 1 10	16	
Fayette		2.80	9			
Greenville b.			1.39	0 15	6	
Itta Bena		2.60	6			
Jackson		3.72	9	1.00 1 00	8	
Natchez			1.30	1 00	1-2	
Vicksburg			1.00	1 00	31	
Do.						
Woodville		3.58	20-21	3.00 2 00	20	
Missouri.						
Appleton City		4.90	28-29			
Downing		2.65	31	2.65 2 00	31	
East Lynne		3.49	28-29			
Eight Mile		2.66	28-29			
Fox Creek		2.88	28-29	1.50 1 35	1	
Ironton			1.30	1 00	19	
Kansas City			1.10	0 59	4	
New Palestine			2.21	2 00	19	
Oakfield		2.96	28-29	1.72 0 40	20	
Panacea		2.80	4			
Potosi		2.76	4			
Do.		2.86	31			
St. Charles		3.20	28-29			
Stellada		2.50	31			
Nebraska.						
Wallace			2.00	0 50	8	
Wilcox	New Jersey.		1.25	0 35	8	
Bayonne		4.05	6	4.05 3 45	6	
Camden			1.56	0 30	31	
Freehold			1.78	1 30	31	
New Brunswick (W.B.)			1.35	0 48	31	
New Brunswick a.	New York.		1.40	0 50	31	
Fort Niagara		2.68	20			
Middletown		3.02	18	3.02 1 00	18	
Minnewaska			1.60	1 15	27	
Willets Point		3.55	6	3.55 1 15	6	
North Carolina.						
Faulkton		3.20	22	3.20 3 00	22	
Goldsboro			2.14	1 00	23	
Greensboro			1.40	1 00	1	
Do.		2.60	22-23	2.00 1 00	22	
Hatteras		5.16	1-2			
Horse Cove			1.10	1 00	19	
Kittyhawk			1.20	1 00	17	
Lilesville		3.90	17	1.46 1 00		
Oak Ridge		11.19				
Salisbury			1.08	0 30	26	
Do.			1.20	1 00	26	
Selma		10.19	2.75	22-23	1.25 1 00	23
Do.		3.35	31	2.80 1 00	31	
Sloan		2.85	2			
Southern Pines		10.48	2.66	30-31		
Stem		4.13	21	4.13 4 10	21	
Washington		11.61	2.76	2		
Do.		2.57	23			
Ohio.						
Clifton		2.52	20-21			
North Lewisburg		3.80	20	3.80 1 25	20	
Sandusky		2.71	20	2.00 2 00	20	
Tiffin		5.08	20			
Westerville	Oklahoma.			1.78 1 15	20	
Fort Supply	Pennsylvania.			1.30 1 00	16	
Aqueduct			1.26	0 49	24	
Ellwood Junction			1.42	1 00	2	
Lebanon			1.49	1 00	24	

Excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.		Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
	Amt.	Day.	Amt.	Day.	Amt.	Day.	
Pennsylvania—Continued.	Inches.	Inches.	Inches.	h. m.			
Pottstown			2.97		6		
Somerset					1.35	20	
South Carolina.							
Allendale			11.39	2.53	9-10	3	
Batesburg			11.74	2.80	23-24	23	
Blenheim				4.10	18		
Branchville			11.73				
Charleston			11.28	3.14	3-4		
Do.				2.73	17-18		
Cheraw b.					1.76	30	
Conway			11.56	4.34	16-17	26	
Cross Hill					1.10	19	
Edisto					1.01	25	
Hardeeville			17.31	5.19	9-10		
Do.				2.52	19		
Kingstree a.				2.52	16-17		
McCormick			12.47		1.45	5	
Do.				2.75	21	9	
Pinopolis			10.63				
St. Georges			10.65	4.20	24-25	25	
St. Matthews			10.20		1.48	10	
Do.					1.20	10	
St. Stephens			12.87	3.32	16	15	
Santuck				3.17	22-23	16	
Shaws Fork				3.00	9-10		
Tennessee.							
Clarksville			2.95	4-5			
Columbia					1.25	20	
Covington b.					1.45	17	
Nashville					1.95	26	
Do.					1.03	31	
Newport			3.07	22			
Palmetto					1.31	29	
Do.					1.56	30	
Rugby					1.10	45	
Texas.							
Eastland			3.70	15-16			
Fort Brown			3.30	30			
Fort Ringgold			3.00	30			
Galveston			2.83	17-18	1.84	17	
Highland			2.60	7			
Longview			2.60	6-7			
Mountain Spring			3.60	19-20			
Weatherford			4.41	6-7			
Virginia.							
Cape Charles			3.10	21	3.10 2 00	21	
Do.					2.00	1 00	
Irwin			3.00	22			
Lynchburg			3.20	22-23	2.75 1 15	22	
Norfolk			2.53	6	2.20 1 00	6	
Do.			3.43	21-22	1.71	21	
Rocky Mount					1.45	22	
Stanardsville					1.20	1 10	
West Virginia.			3.08	22-23		1 30	
Bloomery	Wisconsin.					1	
Barron					2.00	1 10	
						31	
<i>Excessive precipitation in June, 1894, received too late for publication.</i>							
<i>Missouri.</i>							
Fayette			3.39	25-26			
Liberty			2.61	25			
Peterboro	New Hampshire.				1.03	30	
Eastland	Texas.				3.50	5 3-50 2 00	
The following tables show the number of years for which monthly precipitation to equal or exceed 10.00 inches, daily precipitation to equal or exceed 2.50 inches, and hourly precipitation to equal or exceed 1.00 inch has been reported in the several States and Territories for July during the last twenty-four years:							
<i>Frequency of excessive monthly precipitation.</i>							
State.	No. years noted.	State.	No. years noted.	State.	No. years noted.	State.	
Florida	19	Ohio	7	Indiana	6	Michigan	4
North Carolina	14	Nebraska	6	Pennsylvania	6	Kansas	4
Georgia	13	New York	6	Tennessee	5	Massachusetts	4
New Hampshire	11	Iowa	5	Louisiana	5	Mississippi	4
Alabama	11	Arkansas	4	Tennessee	5	Arkansas	4
South Carolina	11	Kansas	8	Mississippi	5	Massachusetts	4
Louisiana	10	Missouri	8	Tennessee	5	Michigan	4
Iowa	9						

Frequency of excessive monthly precipitation—Continued.

State.	No. years noted.	State.	No. years noted.
Texas	4	West Virginia	2
Illinois	3	Colorado	1
New Jersey	3	Connecticut	1
Wisconsin	3	Delaware	1
Maryland	3	District of Columbia	1
Minnesota	3	Indian Territory	1
North and South Dakota	2	Kentucky	1
Virginia	2		

Frequency of excessive daily precipitation.

State.	No. years	State.	No. years
Kansas	20	Wisconsin	10
Iowa	20	Minnesota	9
Indiana	19	Michigan	9
North Carolina	18	Kentucky	9
Georgia	17	New Jersey	8
South Carolina	17	Virginia	8
Pennsylvania	16	Connecticut	8
Florida	16	New Hampshire	6
Nebraska	16	West Virginia	6
Texas	15	Arkansas	6
North and South Dakota	14	Indian Territory	5
Illinois	14	District of Columbia	5
Louisiana	14	Arizona	4
Ohio	14	Colorado	4
Alabama	13	Montana	3
Missouri	12	Rhode Island	3
New York	12	Delaware	3
Tennessee	12	Maine	2
Mississippi	11	New Mexico	2
Maryland	11	Oregon	1
Massachusetts	10	Vermont	1

Frequency of excessive hourly precipitation.

State.	No. years	State.	No. years
Iowa	19	Massachusetts	8
Pennsylvania	17	Mississippi	8
Kansas	17	Maryland	7
North Carolina	17	Kentucky	7
Illinois	16	Wisconsin	6
Alabama	15	Colorado	6
Florida	15	New Jersey	6
Indiana	15	Missouri	5
Nebraska	15	Wyoming	5
Michigan	14	New Mexico	4
Georgia	13	West Virginia	4
New York	13	Indian Territory	4
North and South Dakota	12	Maine	3
Texas	12	Connecticut	3
Virginia	11	District of Columbia	2
Ohio	11	New Hampshire	2
Louisiana	11	Nevada	2
South Carolina	11	California	1
Tennessee	11	Montana	1
Arkansas	9	Utah	1
Minnesota	9	Vermont	1
Arizona	9		

MAXIMUM RAINFALL FROM SELF-REGISTERING GAUGES.

The following table gives the heaviest rainfall during July, 1894, for periods of 5, 10, and 60 minutes, as recorded on self-registering rain gauges at regular stations of the Weather Bureau. This record refers strictly to rainfall. About 37 stations are furnished with self-registering-float-rain gauges and 6 with the self-registering-weighing-rain-and-snow gauge. The float gauge does not record snowfall, and both forms are liable to be interrupted by snow and ice:

Maximum rainfall in one hour or less.

Station.	Maximum rainfall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		Inch.		Inch.	
Atlanta, Ga. *	0.40	29	0.75	29	1.80	29
Baltimore, Md.	0.25	6	0.36	6	0.44	6
Bismarck, N. Dak.	0.02	27	0.04	27	0.12	27
Boston, Mass.	0.35	21	0.50	21	0.73	21
Buffalo, N. Y.	0.17	13	0.25	13	0.47	13
Cincinnati, Ohio	0.10	20	0.17	20	0.44	20
Chicago, Ill.	0.15	20	0.25	20	0.65	20
Cleveland, Ohio	0.09	19	0.13	3	0.53	3
Denver, Colo.	0.50	20	0.80	20	1.01	20
Detroit, Mich.	0.30	18	0.48	18	0.78	31
Dodge City, Kans.	0.07	28	0.12	28	0.21	28
Duluth, Minn.	0.05	1	0.10	1	0.29	1
Eastport, Me.	0.35	17	0.65	17	1.84	17
Galveston, Tex.	0.15	21	0.16	21	0.25	21
Indianapolis, Ind.	0.30	11	0.45	11	1.20	11
Jacksonville, Fla.	0.20	9	0.35	9	0.85	9

Maximum rainfall in one hour or less—Continued.

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		Inch.		Inch.	
Kansas City, Mo.	0.29	4	0.50	4	1.10	4
Key West, Fla.	0.19	5	0.30	5	0.58	28
Marquette, Mich.	0.20	28	0.26	28	0.31	28
Memphis, Tenn.	0.25	19	0.35	19, 20	0.60	19
Milwaukee, Wis.	0.25	14	0.35	14	0.64	14
Nantucket, Mass.	T.	15	0.01	15	0.05	15
Nashville, Tenn.	0.35	31	0.55	31	1.05	26
New Orleans, La.	0.40	14	0.75	14	1.76	14
New York, N. Y.	0.40	14	0.40	14	0.62	6
Norfolk, Va.	0.47	22	0.75	22	2.20	6
Omaha, Nebr.	0.02	3	0.03	3	0.14	3
Philadelphia, Pa.	0.11	24	0.15	24	0.17	24
Pittsburg, Pa.	0.15	2	0.20	2	0.30	2
Portland, Me.	0.12	24	0.20	24	0.61	24
Portland, Oreg.	T.	14	0.01	14	0.03	14
Rochester, N. Y.	0.04	2, 24	0.08	24	0.27	24
St. Louis, Mo.	0.23	28	0.40	28	0.72	28
St. Paul, Minn. f.						
Salt Lake City, Utah	0.08	3	0.15	3	0.31	3
San Diego, Cal. f.						
San Francisco, Cal. f.	0.50	18	0.90	18	1.98	18
Savannah, Ga.						
Seattle, Wash. f.						
Vicksburg, Miss.	0.40	21	0.70	21	1.30	1-2
Washington, D. C.	0.11	29	0.18	24, 29	0.33	24
Wilmington, N. C.	0.40	16	0.65	16	1.83	16

* Record incomplete.

† Less than 0.05 in 1 hour.

EXCEPTIONAL PRECIPITATION.

The following tables give exceptionally heavy monthly, daily, and hourly precipitation reported for July, by any station, regular or voluntary, and in any year since 1871:

Exceptional monthly precipitation.

Station and state.	Amt.	Year.	Station and state.	Amt.	Year.
	Inches.			Inches.	
White, Tenn.	28.11	1883	Wilmington, N. C.	21.12	1886
Mount Washington, N. H.	23.90	1884	Auburn, Ala.	21.09	1887
Macon, Miss.	23.87	1892			

Exceptional daily precipitation.

Station and state.	Amount.	Date.	Station and state.	Amount.	Date.
	Inches.			Inches.	
Edwards, Miss.	16.70	6-8, 1892	De Land, Fla.	6.05	12-13, 1891
Tuscumbia, Ala.	10.00	9-10, 1892	Scottsboro, Ala.	6.00	16, 1892
Union Point, Ga.	10.00	29, 1887	Centerville, Iowa	6.00	1, 1892
St. Andrews Bay, Fla.	9.85	8-10, 1892	Opelousas, La.	6.00	25-27, 1892
South Orange, N. J.	8.57	30-31, 1892	Russellville, Ark.	6.00	29, 1892
Columbus, Miss. b.	8.30	7-8, 1892	Oberlin, Kans.	5.57	26-27, 1893
Fort Barrancas, Fla.	8.28	22-23, 1892	Warrensburg, Mo.	5.50	1893
Logan, Iowa	8.00	10, 1878	Houma, La.	5.47	8-10, 1892
Okolona, Miss.	7.90	8-9, 1892	Waynesboro, Ga.	5.43	9-10, 1894
Minneapolis, Minn.	7.80	26-27, 1892	Lake Charles, La.	5.40	27, 1892
Plaquemine, La.	7.75	5, 1891	Manhattan, Kans.	5.38	23, 1892
Independence, Mo.	7.61	14, 1893	Houma, La.	5.35	25-26, 1892
Wilmington, N. C.	7.33	15, 1888	Keeses Ferry, Ark.	5.22	4-5, 1894
Agricultural Col., Miss.	7.24	7-8, 1892	Hardeeville, S. C.	5.19	9-10, 1894
Hulmeville, Pa.	7.00	26, 1879	Manchester, N. H.	5.17	23-24, 1897
Marengo, Ind.	7.00	23, 1890	Rock Island Arst'l, Ill.	5.16	13, 1892
Lexington, Mo.	6.44	4-5, 1893	Hatteras, N. C.	5.16	1-2, 1894
Chelyagan, Mich.	6.34	7-8, 1890	Cambridge, Md.	5.12	31, 1893
Hudson, Wis.	6.30	27, 1892	Maple Plains, Minn.	5.11	26-27, 1892
Greenville, Miss.	6.21	27-28, 1891	Oxford, Fla.	5.10	27, 1893
Rocky Ford, Colo.	6.20	8, 1893	Griffin, Ga.	5.10	26-27, 1894
Corydon, Iowa	6.19	1-2, 1892	Lamont, Mo.	5.09	4-5, 1893
Grand Junction, Tenn.	6.10	13-14, 1890	Edwards, Miss.	5.08	20, 1894
Payson, Ariz.	6.09	25-26, 1892	Fort Clark, Tex.	5.00	7-8, 1892
Charleston, S. C.	6.07	27-28, 1890		5.00	10, 1899

Exceptional precipitation for one hour or less.

Station and state.	Amount.	Date.
	Inches.	
New Orleans, La.	0.68	0 05
Jacksonville, Fla.	0.55	0 05
Detroit, Mich.	0.50	0 05
Savannah, Ga.	0.50	0 05
Norfolk, Va.	0.48	0 05
Do.	0.47	0 05
Savannah, Ga.	0.47	0 05
Galveston, Tex.	0.45	0 05
Jupiter, Fla.	0.45	0 05
Do.	0.43	0 05

Exceptional precipitation for one hour or less—Continued.

Station and state.	Amount.	Time.	Date.
Inches.	h. m.		
Key West, Fla.	0.41	0 05	23, 1893
Atlanta, Ga.	0.40	0 05	29, 1894
New Orleans, La.	0.40	0 05	14, 1894
New York, N. Y.	0.40	0 05	14, 1894
Vicksburg, Miss.	0.40	0 05	21, 1894
Wilmington, N. C.	0.40	0 05	16, 1894
Boston, Mass.	0.40	0 05	4, 1891
Jupiter, Fla.	0.40	0 05	2, 1893
Chicago, Ill.	0.40	0 05	14, 1890
Dodge City, Kans.	0.40	0 05	6, 1891
Savannah, Ga.	0.40	0 05	8, 1890
Washington, D. C.	0.40	0 05	15, 1891
St. Paul, Minn.	0.40	0 05	26, 1892
Wilmington, N. C.	0.38	0 05	10, 1892
Milwaukee, Wis.	0.35	0 05	15, 1893
Do.	0.35	0 05	9, 1893
Boston, Mass.	0.35	0 05	21, 1894
Galveston, Tex.	0.35	0 05	17, 1894
Detroit, Mich.	0.35	0 05	27, 1892
Nashville, Tenn.	0.35	0 05	31, 1894
St. Louis, Mo.	0.35	0 05	13, 1892
Tampa, Fla.	0.35	0 05	7, 1892
Savannah, Ga.	0.33	0 05	18, 1892
Atlanta, Ga.	0.32	0 05	12, 1892
Cleveland, Ohio.	0.32	0 05	24, 1892
Washington, D. C.	0.32	0 05	14, 1892
Philadelphia, Pa.	0.31	0 05	3, 1892
Savannah, Ga.	0.30	0 05	2, 1893
Dodge City, Kans.	0.30	0 05	15, 1894
Jacksonville, Fla.	0.30	0 05	11, 1894
Baltimore, Md.	0.30	0 05	8, 1893
Dodge City, Kans.	0.30	0 05	15, 1893
Indianapolis, Ind.	0.30	0 05	26, 1892
Washington, D. C.	0.30	0 05	2, 1890
Norfolk, Va.	0.29	0 05	2, 1892
Kansas City, Mo.	0.29	0 05	4, 1894
Do.	0.28	0 05	4, 1893
Salt Lake City, Utah	0.27	0 05	27, 1893
Baltimore, Md.	0.25	0 05	8, 1894
Memphis, Tenn.	0.25	0 05	19, 1894
Milwaukee, Wis.	0.25	0 05	14, 1894
Boston, Mass.	0.25	0 05	3, 1892
Memphis, Tenn.	0.25	0 05	11, 1892
Atlanta, Ga.	0.25	0 05	31, 1893
Cincinnati, Ohio.	0.25	0 05	8, 1893
Marquette, Mich.	0.25	0 05	24, 1893
New York, N. Y.	0.25	0 05	3, 1892
Huron, S. Dak.	1.30	0 10	26, 1895
Albany, N. Y.	1.22	0 10	10, 1870
Grove Dale, Kans.	1.00	0 10	17, 1893
Utica, N. Y.	1.00	0 10	8, 1893
Savannah, Ga.	0.92	0 10	18, 1891
Norfolk, Va.	0.91	0 10	16, 1893
Savannah, Ga.	0.90	0 10	18, 1894
Jacksonville, Fla.	0.85	0 10	8, 1893
New Orleans, La.	0.81	0 10	12, 1893
Detroit, Mich.	0.80	0 10	20, 1894
Galveston, Tex.	0.75	0 10	12, 1893
New Orleans, La.	0.75	0 10	14, 1894
Atlanta, Ga.	0.75	0 10	29, 1894
Norfolk, Va.	0.75	0 10	22, 1894
St. Paul, Minn.	0.70	0 10	26, 1892
Vicksburg, Miss.	0.70	0 10	21, 1894
Dubuque, Iowa	0.67	0 10	2, 1899
Key West, Fla.	0.65	0 10	23, 1893
Galveston, Tex.	0.65	0 10	17, 1894
Wilmington, N. C.	0.65	0 10	16, 1894
Jupiter, Fla.	0.60	0 10	2, 1893
Wilmington, N. C.	0.60	0 10	20, 1892
Dodge City, Kans.	0.56	0 10	21, 1893
Nashville, Tenn.	0.55	0 10	31, 1894
Washington, D. C.	0.53	0 10	14, 1892
Detroit, Mich.	0.52	0 10	27, 1892
Savannah, Ga.	0.52	0 10	18, 1892
Boston, Mass.	0.50	0 10	21, 1894
Kansas City, Mo.	0.50	0 10	4, 1894
Atlanta, Ga.	0.50	0 10	12, 1892
Milwaukee, Wis.	0.50	0 10	15, 1893
Norfolk, Va.	0.50	0 10	18, 1890
New York, N. Y.	0.50	0 10	27, 1880
Tampa, Fla.	0.50	0 10	7, 1892
Sandusky, Ohio.	2.25	0 15	11, 1879
Portsmouth, Ohio.	1.62	0 15	30, 1892
Amana, Iowa	1.56	0 15	31, 1878
New Orleans, La.	1.40	0 15	6, 1899
Greenville, Miss.	1.39	0 15	6, 1894
Centerville, Iowa	1.25	0 15	19, 1894
Philo, Ill.	1.20	0 15	8, 1888
New York, N. Y.	1.00	0 15	13, 1880
St. Matthews, S. C.	1.05	0 15	17, 1894
New Market, Ala.	1.05	0 15	12, 1899
Rancocas, N. J.	1.00	0 15	17, 1890
St. Paul, Minn.	1.00	0 15	26, 1892
Easton, N. Y.	0.99	0 15	6, 1893
Amherst, Mass.	2.00	0 20	16, 1879
West Leavenworth, Kans.	1.90	0 20	21, 1887
New Palestine, Mo.	1.52	0 20	28, 1892
Rancocas, N. J.	1.25	0 20	18, 1893
Lynchburg, Va.	1.00	0 20	3, 1892
Wild Rice, N. Dak.	1.63	0 23	14, 1893
East Peoria, Ill.	1.54	0 25	31, 1894
Black River Falls, Wis.	1.47	0 25	14, 1893
Greensboro, N. C.	1.35	0 25	19, 1893
Charleston, S. C.	2.18	0 27	10, 1893
Logansport, Ind.	3.50	0 30	7, 1897

Exceptional precipitation for one hour or less—Continued.

Station and state.	Amount.	Time.	Date.
Inches.	h. m.		
Hess Road Station, N. Y.	2.53	0 30	22, 1892
Wilkesbarre, Pa.	2.52	0 30	15, 1890
Peoria, Ill. b	2.05	0 30	5, 1893
Scofield, Utah	2.01	0 30	21, 1893
Benton Harbor, Mich.	2.01	0 30	14, 1890
Centerville, Iowa	1.97	0 30	22, 1894
Washington, Ark. b	1.68	0 30	24, 1893
Fairfield, Iowa	1.62	0 30	21, 1892
Tarpon Springs, Fla.	1.58	0 30	9, 1894
Camden, N. J.	1.56	0 30	31, 1894
Brag, Ga.	1.55	0 30	15, 1894
Columbus, Ga.	1.50	0 30	7, 1893
Newbern, N. C.	1.35	0 35	20, 1892
Jacksonville, Fla.	3.49	0 40	6, 1886
Sloan, N. C.	2.50	0 40	2, 1893
Fort Sully, S. Dak.	2.05	0 40	5, 1893
River Bend, Colo.	2.00	0 40	28, 1893
Point Peter, Ga.	3.20	0 45	18, 1894
Wilcox, Nebr.	2.45	0 45	16, 1893
Springer, N. Mex.	3.85	0 50	13, 1891
Lansing, Mich.	3.40	1 00	21, 1883
Middletown, N. Y.	3.02	1 00	18, 1894
Rock Island Arsenal, Ill.	5.16	1 15	13, 1899
Tucson, Ariz.	5.10	1 45	II, 1878

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 10, 11, 16, 19, 20, 22, 23, 26, 27. Arkansas, 17, 18, 27. Colorado, 2 to 9, 11 to 19, 21, 25, 28 to 31. Connecticut, 14, 29, 30, 31. Illinois, 1, 2, 25, 26, 28, 31. Indiana, 1, 30. Iowa, 19, 24, 30. Kansas, 3, 5, 7, 18, 29. Kentucky, 1, 2, 3. Louisiana, 1, 2, 3, 6, 8. Maine, 25. Maryland, 3, 6, 26. Massachusetts, 2, 14, 16, 17, 21, 25, 29. Michigan, 1, 19, 28. Minnesota, 28, 30, 31. Mississippi, 25. Missouri, 1, 2, 4, 28, 29. Montana, 3, 5, 12, 16, 17, 24. Nebraska, 8, 29, 30. Nevada, 1, 3, 16, 23, 24, 30, 31. New Hampshire, 2, 14, 25. New Jersey, 6, 16, 29, 31. New Mexico, 3, 8, 13, 20. New York, 6, 25, 29. North Carolina, 15, 23. Ohio, 2, 6, 20. Oklahoma, 16, 28. Oregon, 3, 14, 19. Pennsylvania, 16, 20, 23, 26, 31. Rhode Island, 14. South Dakota, 3, 5 to 8, 11, 13, 14, 18, 21, 24, 25, 26. Tennessee, 1, 2, 26. Utah, 5, 13. Virginia, 1, 3, 15, 20, 29. West Virginia, 1, 2. Wisconsin, 5, 14, 30, 31. Wyoming, 4, 5, 18, 19.

DROUGHT.

The prairie and forest fires of July and subsequent months have thrown into the atmosphere an unusual and immense quantity of moisture, but have not resulted in any extensive rain as far as known. Evidently the mere addition of moisture to the atmosphere, or its subsequent cooling into haze, fog, and clouds, does not suffice to make rain. The summer of 1894 has presented a series of unusual local droughts, amounting in fact to a general drought over the northern half of the United States.

The Monthly Review of the Iowa Weather and Crop Service states that July, 1894, has become historic, breaking all previous records, as the driest month ever experienced in Iowa; the culminating period of the drought was on the 25th, 26th, and 27th, during which the wind attained a high velocity and the temperatures, at voluntary stations, varied from 100° to 109°; the mean temperature was not always the warmest, but the drought was the more severe and protracted and was especially felt because the rainfall of the preceding June was also below the normal.

The July Monthly Bulletin of the Minnesota Weather Service states that notwithstanding the deficient rainfall for June still at the beginning of the month the drought had not proved injurious, but the excessive heat and great deficiency of rainfall during July did great injury to the crops. The temperature of the 26th was the highest for at least thirty-three years.

The Monthly Bulletin of the Missouri Weather Service for July says that in the center and northern portions of the State the month was characterized by unusually high temperatures, a high percentage of sunshine, and drought conditions, that in some localities were the severest that have been experienced for many years, and proved most disastrous to agricultural interests. The hot winds that prevailed on the 24th, 25th, and 26th caused the standing corn to fire badly, and many fields were utterly ruined except for fodder.

The July report of the Ohio Weather and Crop Service notes five days of general and heavy rains and seventeen days of light local rains; the greatest local monthly precipitation was 5.16 and the least 0.05. Notwithstanding this rain the report states the average precipitation was deficient, and that at the close of the month the crops were rapidly drying up.

The July Bulletin of the Oklahoma Weather Service states that in Oklahoma City rain fell on four days only, and the total amount was about one-third of the normal. At the close of the month rain was badly needed.

The Monthly Weather Review of the Pennsylvania State Weather Service says: "The extremely warm and dry weather, with high percentage of sunshine, continuing throughout the entire month, produced a general drought."

The Monthly Bulletin of the Kentucky Weather Service for the month of July says: "There was a deficiency of precipitation in nearly all sections of the State. A very serious drought set in and continued through the month."

The Monthly Meteorological Summary of the South Dakota Weather Service for July says: "The month was excessively warm, with hardly any precipitation. All the crops suffered severely from the drought and high winds."

WIND.

PREVAILING WINDS.

The prevailing winds for July, 1894, viz., those that were recorded most frequently at Weather Bureau stations, are shown in Tables I and VIII; they are not given on Chart II, as has hitherto been the custom, but the resultant winds are published instead.

RESULTANT WINDS.

The resultant winds for the current month, as deduced from the hourly records by self-registers at about 67 regular Weather Bureau stations, are given in Table VIII. Other resultants, deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart II, in connection with the isobars based on the same system of simultaneous observation; the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a wind of average velocity; these figures (or the ratio between them and the total number of observations in this month) indicate the extent to which winds from different directions counterbalanced each other. The original north, south, east, and west components are given in detail in Table IX.

During July the resultant movement was generally from the southwest in New England, the middle and south Atlantic States, the Florida Peninsula, Ohio Valley and Tennessee, lower Lake region, North Dakota, upper Mississippi and Missouri valleys.

HIGH WINDS.

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes; extreme velocities are gusts of shorter duration):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex.....	30	Miles. 54	n. sw.	Little Rock, Ark.....	1	Miles. 55	ne. w.
Chicago, Ill.....	12	50	sw.	Pikes Peak, Colo.....	27	72	
Huron, S. Dak.....	11	60					

LOCAL STORMS.

Destructive or severe local storms were reported as follows:

1st.—Waynesboro, Va., 2 persons killed and 1 injured by lightning. Adairsville, Ga., horse killed by lightning. Greenville, Miss., 1 person killed by lightning. Glen Allan, Miss.,

1 person killed by lightning. Memphis, Tenn., 1 person killed by lightning. Golconda, Ill., hailstorm. Olney, Ill., and Delphi, Ind., thunderstorms. Greenville, Mo., hailstorm.

2d.—Fall River and Siasconset, Mass., thunderstorms. Near Hess Road Station, N. Y., horse killed by lightning. New Cumberland, W. Va., thunderstorm. Pensacola, Fla., horse killed by lightning. Nashville, Tenn., windstorm. Golconda, Ill., hailstorm.

3d.—Lynchburg, Va., thunderstorm. Radensburg, Mont., hailstorm. Salt Lake City, Utah, thunderstorm.

4th.—Kansas City and Palestine, Mo., thunderstorms. Near Houston, Mo., 2 horses killed by lightning. Table Rock, Colo., thunderstorm.

5th.—Marysville, Mont., 4 horses killed by lightning. Spokane, Wash., thunderstorm.

6th.—Elmira, N. Y., hailstorm. Stephens City, Va., stock killed by lightning. Lovilia, Iowa, thunderstorm.

7th.—Independence, Kans., hailstorm. Southeast of Miles City, Mont., man and horse killed by lightning. Sixteen miles southwest of Spokane, Wash., man killed by lightning.

8th.—North Platte, Nebr., horse killed by lightning.

9th.—Hawkinsville, Ga., thunderstorm. Gardnerville, Nev., several persons stunned and a horse killed by lightning.

10th.—Detroit, Mich., thunderstorm.

11th.—Huron, S. Dak., windstorm.

13th.—Tampa, Fla., and Binola, Ohio, thunderstorms. Near Bellefontaine, Ohio, a boy and horse killed by lightning.

14th.—New York, N. Y., 1 person killed. Middletown and Wappingers Falls, N. Y., thunderstorms. Eldorado, Kans., stock killed by lightning.

15th.—Hillsboro, N. Y., thunderstorm. Winnview, Okla., 3 persons injured by lightning. Levan, Utah, man killed by lightning.

16th.—At Algiers, La., 2 persons killed and 19 stunned by lightning. Lehigh, Ind. T., 1 person fatally injured by lightning.

18th.—Point Peter, Ga., rainstorm. Little Rock, Ark., thunderstorm.

19th.—Louisville, Ky., and Gainesville, Tex., thunderstorms. Burr Oak, Mich., 3 persons stunned by lightning.

20th.—Niagara County, N. Y., windstorms. Tiffin, Ohio, thunderstorm. Rawsonville, N. Y., thunderstorm.

21st.—Boston, Mass., thunderstorm. Dover, Del., 2 persons injured and a horse killed by lightning. Norfolk, Va., 2 persons killed by lightning.

24th.—Near Detroit, Mich., thunderstorm. Port Huron, Mich., horse killed.